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RESPONSE TO SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL COMMENTS ON RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT ADDENDUM CLOUTER ISLAND CNC CHARLESTON SC

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ENSAFE INC.

RESPONSE TO COMMENTS FOR CLOUTER ISLAND RFI REPORT ADDENDUM CHARLESTON NAVAL COMPLEX DATED SEPTEMBER 2002

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Prepared for:

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA

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RESPONSE TO SOUTH CAROLINA
DEPARTMENT OF HEALTH AND EVIRONMENTAL CONTROL (SCDHEC)
COMMENTS ON THE CLOUTER ISLAND RFI REPORT ADDENDUM
Dated September 2002

SCDHEC ENGINEERING COMMENTS
Jerry Stamps

Comment 1
Section 1.1, Site History - AOC 693 was identified as fuse and primer house. AOC 694 was identified as the Naval Ammunition Depot. It is stated in this section that ordnance was discovered and removed from Clouter Island in 1985. However, there is no discussion as to what type of investigation took place to determine if addition ordnance remains on the island. The Navy should describe such investigation and the level of certainty for which ordnance does not remain in place. To date, the Department has not granted a No Further Action determination for an area in which unexploded ordnance potentially remains in place.

Response 1
A survey was conducted by an unexploded ordnance subcontractor prior to initiation of any sample collection effort. The survey was designed to identify the presence of unexploded ordnance from the ground surface to a depth of 5 feet bgs through the AOC 693/694 area as presented in Section 10.6 of the June 1999 RFI Report. No additional unexploded ordnance was found to be remaining on the site. The 2002 RFI Report will be revised to include this text.

Comment 2
Section 5.2.2.1, Surface Soil Inorganic RBC Exceedances, Copper
The background concentration for copper should be 119 ppm rather than 5.7 ppm. Please revise accordingly.

Response 2
The report will be revised to reflect the background concentration value for copper in soil of 119 mg/kg.

Comment 3
Figure 5-1
This figure is missing a scale. Additionally, for the sake of clarity the concentration units should be included in all figures. Please revise accordingly.

Response 3
A scale will be added to Figure 5-1. Concentration units will be added to all figures.

Comment 4
Figure 5-2
Sample 694SB41A is identified as an "offset" sample from sample 964SB41. One would assume that this sample was collected immediately adjacent to the original sample. The distance of the offset sample from the original sample should be clarified in the text. This is significant considering the substantial difference between the analytical results of the samples.

Response 4
The offset distance of soil boring 694SB41A from soil boring 694SB041 is less than 0.5 feet. Report text will be revised to clarify sample location 694SB41A offset distance from location 694SB041.

Comment 5
Section 5.3.1, Organic Compounds in Groundwater, TEQs
The MCL for TEQs is incorrectly referenced in this section. The correct MCL is 30 pg/L rather than 0.03 pg/L. The error lies in the conversion from mg/L to pg/L. A picogram represents 10^{-12} g rather than 10^{-9} g. Please revise accordingly.

Response 5
The report reference will be revised to state that the MCL for TEQs is 30 pg/L.

Comment 6
Section 5.3.1.2, Inorganic Compounds in Groundwater, Silver
This section incorrectly references the MCL for silver as 100 ppb. An MCL for silver does not exist. This section should state the data was screened against the EPA Region 3 Tap Water RBC of 180 ppb. It should be noted that the data does not exceed this RBC.

Response 6
The report will be revised to state that data for silver were screened against EPA Region III Tap Water RBC of 180 ug/L.

Comment 7
Figure 5-6
Monitoring wells 694-002, -003, -004, -005, -006, -007 all had TEQ detections in the first three rounds of sampling. However, according to this figure all wells were non-detect for TEQs in the fourth round. This appears quite anomalous considering the consistent previous detections of TEQs. Please clarify if the TEQs were truly non-detect in all wells, or if the wells were not sampled for TEQs in the fourth round.

Response 7
All six wells were sampled for dioxins in the fourth round and all six wells reported non-detects for TEQs. The text in the report will state that the fourth round had non-detects for TEQs in all six wells.

Comment 8
Section 6.0, Fate and Transport; Appendix D
The hydraulic conductivity of 11 feet/day (1220 m/yr) for calculating the site specific DAF seems rather high. As a basis for comparison, some current site specific SSLs calculated at Zone E used hydraulic conductivities of 222.5 m/yr and 611.9 m/yr. Please verify that the hydraulic conductivity used in these calculations is appropriate.

Response 8
Zone E geology is quite varied and it is no surprise that different site-specific SSLs were estimated based on lithologies encountered at different AOC/SWMU locations. Table 6.3.1 of the Draft Zone E RFI Report (EnSafe, November, 1997) presents the derivation of site-specific dilution factors. Horizontal hydraulic conductivity for each of the 20 Zone E site groups presented in this table ranges from 626 to 1220 m/y. The value of 1223.8 m/y (11 ft/d) is the Zone E geometric mean for Qs.

Rational for the horizontal conductivity value used in calculating site-specific SSL dilution factors for Clouter Island is presented in the introduction to Appendix D of the August 2002 Clouter Island RFI Report.

Comment 9
Section 6.1, Organics
Please see Comment #5 concerning the MCL for TEQ.

Response 9
The report will be revised to state the MCL for TEQs is 30 pg/L.

SCDHEC HYDROGEOLOGY COMMENTS
Jo Cherie

Section 2.2 Groundwater

1. The Navy has identified three groundwater flow paths and calculated the groundwater flow rate along each path. The Navy has adopted an effective horizontal conductivity value (Kh) and a porosity (assumed average) value as presented on Table 2.13 entitled Geometric Means of Hydraulic Parameters for Zone E Lithology Types Based on All Estimation Methods presented in the Draft Zone E RFI Report, dated 1997. The Division of Hydrogeology has two concerns regarding the calculated rate(s) of groundwater flow.

    a. The three groundwater flow rates calculated for Clouter Island are: Flowpath A equal to 0.489 feet per day (178 feet per year); Flowpath B equal to 0.293 feet per day (107 feet per year); and Flowpath C equal to 0.391 feet per day (143 feet per year). While these three flow rates are similar they appear excessive when compared to the "relatively slow" (approximately 15 feet per year) rate the Navy has calculated for the Base. Clarification is needed.

Response 1a
Lithologic information from well borings for the site was reviewed. It was

determined that a medium to coarse grey sand (Qs1) was encountered in most of the wells on site. A geologic map (Figure 2-1) was developed for that portion which is in the saturated interval. The distribution of this lithologic type indicates that it is the primary aquifer material of concern and most directly impacts contaminant transport in groundwater. A faster horizontal conductivity for this portion of CNC than for CNC as a whole is entirely appropriate based on description and visual inspection of this material.

b. It is questionable as to whether these values should be applied to each of the three flow paths. According to the Monitoring Well Logs provided in Appendix A, the screened interval of wells K694002 and K694004 were not logged while the screened interval of wells K694003, 010, 011, 012, 015, and 016 record clay, marsh clay, clayey, silt and chunks of the Cooper Marl. The 11 feet per day maximum Kh value calculated for Zone E may not be applicable across the whole of Clouter Island. For Clouter Island the Navy has used a porosity value of 0.45, which is assumed to be an average of the three values presented on referenced Table 2.13.

Response 1b
Well 694002 was installed in a soil sample boring and the interval below 5 feet was not logged. However, review of the surrounding area wells indicates the presence of a well developed and extensive sand over the area incorporating wells GDKCL1, 6984002, 694008, 694009, 694013, and 694015. Well 694004 was installed in dredge spoil material above the berm and is not included in the geologic assessment. Well 694003 is indeed mapped as being completed in a marsh clay that is of limited aerial extent. Wells 694010, 694011, and 694012 are mapped near a contact between Qs1 and Qc indicating that there may be some boundary conditions due to the presence of clay which may either be of an interbedded nature between intervals of clean sand, or more uniformly distributed within the sand. Well 694015 has a greater portion of sand in the saturated screened interval and was therefore used in the mapping and groundwater velocity estimates as the worst case scenario with regard to contaminant transport and travel time estimates. An extremely limited development of marsh clay is reflected in the area of well 694016. The area of marsh clay (Qm) development may be slightly larger than depicted but it is still very limited based on well 694005 lithologic data and lithologies encountered during collection of lower interval soil samples located west and south of well 694016. As such Qm is not a primary aquifer material for the site. Consequently Qm was not used for estimating the groundwater velocity along flow path B in favor of the more predominant lithology of the area indicated at well 694005 as a worst case scenario.

The porosity value of 0.45 was used to evaluate Zone E fate and transport (Table 6.1.2) as the geometric mean of sand porosity (Section 6) and again in calculating Clouter Island site specific SSL dilution factors (Appendix D).

Consequently, the Navy does not feel that revisions to the report are needed regarding the horizontal conductivity used in estimating groundwater flow

velocities.

2. In addition, groundwater elevation data should be provided in table format and the wells used for calculating the horizontal gradient should be identified.

Response 2:
The report shall be revised to include groundwater elevation data in tabular format. Wells were not used in determining hydraulic gradients. Groundwater elevation contours were developed by interpolation of elevation data. Gradients were estimated by drawing a flow arrow based on the groundwater elevation contours. Groundwater gradients were estimated by measuring the length of the flow arrow used to represent the location where the distance over which the change in head between contours occurred as indicated on Figure 2-2.

Section 3.2.3.1 Shallow Monitoring Well Installation

3. The Navy has provided monitoring well construction logs in Appendix A. Note that these logs are incomplete for NBCKGDKCL1 and K694002 through K694007 in that the ground surface elevation and top of casing elevation data has been omitted. This data is necessary to an understanding of the relationship between ground surface, mean sea level and the water table. Even though these monitoring wells have been abandoned, the Navy should search the field logs kept during installation and provide the pertinent data, as available.

Response 3
It was understood during the initial RFI that groundwater flow was toward the Cooper River. Groundwater elevation was not considered necessary and elevation control for surveying was not carried across the river during the early portion of the RFI. Consequently, wells GDKCL1, and 694002 through 694007 were not surveyed with respect to elevation.

Section 4.7.2 Groundwater Blanks

4. The Navy must provide the analytical data for the distilled water blanks, the field blanks, and the laboratory blanks in order for the reviewer to evaluate the data. Each set of blanks should be clearly labeled to identify the sampling event for which they are applicable. The presence of numerous volatile, semi-volatile organic compounds and inorganics in the blank samples is of concern such that the validity of the data collected is questionable. Of specific concern is the presence of inorganics detected in the laboratory blanks during the January 1998, December 1999, and January 2000 sampling events. Additional groundwater samples may be required.

Response 4
The report will be revised to include analytical data for QA/QC blanks.

Section 5.2.2.1 Surface Soil Inorganic RBC Exceedances
Section 5.2.2.2 Surface Soil Inorganic SSL Exceedances
Section 5.2.2.3 Subsurface Soil Inorganic SSL Exceedances

5. Although mercury was not detected in surface soil at concentrations above its residential

risk based concentration, mercury did exceed the soil screening level (SSL) of 1.15 milligram per kilogram (mg/kg) at two of these locations. Mercury was also detected at one subsurface soil location (694SB008) at a concentration that slightly exceeded the SSL. According to Table 5.2, entitled Inorganic Element Background Calculations for Shallow Groundwater, mercury was not detected in background groundwater samples but has been detected in six of the sixteen monitoring wells. During the last sampling event, mercury was detected at monitoring well K694GW003 at 7.6 micrograms per liter (μg/L), which exceeds its maximum contaminant level (MCL) of 2 μg/L. This provides direct evidence that the soil-to-groundwater pathway is complete. The monitoring wells have been abandoned and the Navy has not proposed to collect additional groundwater samples to confirm or monitor this mercury detection. It is possible that the concentrations of mercury in surface and subsurface soil may continue to be a source of leaching to groundwater. See Comment 16.

Response 5
Two surface soil samples (694SB01901 (1.7 mg/kg)) and 694SB04001 (1.3 mg/kg)) and one subsurface sample (694SB00802 (1.4 mg/kg)) had mercury detections exceeding the SSL value of 1.15 mg/kg. Lower interval samples for evaluation were not collected at locations 694SB019 and 694SB040 due to saturated conditions in the sample interval. However, mercury was not detected in groundwater samples from wells down gradient of the SSL exceedances. Therefore, the soil to groundwater pathway is considered incomplete.

Mercury was detected in only 7 out of 43 ground water samples. Only one detection (694GW00304 (7.6 □g/L)) exceeded the MCL of 2 □g/L. Well 694003 was located down gradient of soil boring locations 694SB012, 694SB013, 694SB033, 694SB034, 694SB042, and 694SB050. The highest detection of mercury in soil up gradient of well 694003 was 0.55 mg/kg at 694SB05001. All other detections at these soil boring locations were less than 0.3 mg/kg.

6. The Navy states that thallium was detected in seventeen (17) surface soil samples at concentrations that exceed the residential risk based concentration of 0.548 milligrams per kilogram (mg/kg); thallium was also detected in twenty (20) surface soil samples and ten (10) subsurface soil samples at concentrations that exceed the soil screening level (SSL) of 0.392 mg/kg. According to Table 5.2 referenced above, thallium was not detected in groundwater from background well GDKCL1. However, thallium was detected in four downgradient groundwater samples at concentrations that exceed the MCL of 2 μg/L. Noteworthy is that these four exceedances were detected in the most recent sampling event, the wells have been abandoned, and the Navy has not proposed to collect additional groundwater samples. It is evident that the elevated concentrations of thallium in surface and subsurface soil will continue to be a source of thallium to groundwater. See Comment 16.

Response 6
Thallium in soil is presented in Section 5.2.2 of the 2002 RFI Report where it is indeed stated that thallium was detected in 20 of 49 samples with a range of 0.47 to

1.50 mg/kg, and that 17 upper interval samples exceeded the RBC of 0.548 mg/kg. However, it also states that the 17 RBC exceedances are within the background range for base-wide thallium results in soil (0.12 to 2.80 mg/kg). Detections of thallium in groundwater, as with other metals in soil and sediment, may therefore naturally exhibit considerable variation ranging upwards from non-detection reflecting variations in the matrix through which groundwater flows and not from a source related to Navy operations at the site. The Navy does not propose any additional sampling for thallium.

7. In order to ascertain whether the dredge spoil could be a possible source of mercury and thallium, the Navy should provide analytical data of the dredge spoil sediments that are being staged on Clouter Island. Note that mercury fulminate may have been a component of the detonating fuses. See Reference below.

Response 7
There are three sample locations (694SB027, 694SB049, and 694SB050) located in the Clouter Island dredged materials area. Table 5.6 in the Zone K Clouter Island RFI Report Addendum lists the analytical results for the sample locations and the detections for mercury and thallium. The Navy does not consider the detections at these locations as a possible source for mercury and thallium.

Section 5.3 Nature and Extent of Contamination in Groundwater

8. The Legend on Figures 5-5, 5-6, and 5-7 should be revised as follows:
   a. Each of these Figures has a gray symbol for "Monitoring Well Not Sampled". However, Analytical Reports and Chain of Custody can be found in Appendix B for each of these wells. The Legend should be revised to inform the reviewer that although groundwater samples were collected from these wells, the analytical results yielded no detections of the constituent or parameter being depicted.

   b. The Legend should identify the acronyms reported on the Figure, i.e. BEQ should be identified as benzo(a) pyrene equivalent while TEQ should be identified as tetrachlorodibenzo-p-dioxin (TCDD) Equivalency Quotient.

   c. The units of measure for each detected constituent should be included. For example, either picograms, milligrams, or micrograms per liter.

Response 8
Clarification of map legends will be made and revised as necessary.

Section 5.3.1 Organic Compounds in Groundwater

9. The text states that chloromethane was detected at 8.00 µg/L in monitoring well K694013 during the sixth groundwater sampling event and TEQs were detected in certain wells during a fifth and sixth sampling event. Numerical clarification of the groundwater sampling events should be provided on Figure 5-5 and Figure 5-6. There are four sampling events for most of the wells represented on these Figures. The TEQ data for the fifth sampling event should simply be added to the tag boxes on the Figures and clarification of the sampling

event number should be provided, i.e., does the event number refer to site wide groundwater sampling or to sampling events at each individual well. The data should be presented so that the reviewer can correlate data collected at the same time. The use of actual dates may alleviate the confusion created by numbering the sampling events.

Response 9
The report will be revised to address sampling events and dates.

Section 5.3.1.2 Inorganic Compounds in Groundwater

10. There appears to be confusion regarding which constituents have promulgated MCLs, Secondary Drinking Water Regulations (SDWR) and/or RBCs and how these should be applied. For example, the Navy states "12 groundwater detections exceeded the aluminum MCL of 50 µg/L." However, no MCL has been established for aluminum.

According to the US EPA 2002 Edition of the Drinking Water Standards and Health Advisories, Secondary Drinking Water Regulations (SDWR) are provided as guidelines regarding cosmetic or aesthetic effects while maximum contaminant levels (MCLs) are the "highest level of a contaminant that is allowed in drinking water." The Navy has misapplied the appropriate standards to the following parameters:

- Aluminum has a final SDWR from 0.050 to 0.2 milligrams per liter (mg/l);
- Manganese has a final SDWR of 0.05 mg/l;
- Antimony has a promulgated MCL of 0.006 mg/l;
- Chromium (total) has a promulgated MCL of 0.1 mg/l;
- Copper has a action level of 1.3 mg/l;
- Iron has a SDWR of 0.3 mg/l;
- Lead has an action level of 0.015 mg/l; and
- Zinc has a SDWR of 5 mg/l.

The Navy should re-evaluate the data and revise the RFI Report accordingly.

Response 10
According to the *Charleston Naval Complex Project Team Notebook and Instructions* Section 4.4.4 states "MCLs are the appropriate screening criteria for parameters that have one. A list of current MCLs is provided in Appendix K. For parameters that do not have MCLs, the Region III tap water RBCs may be used as screening criteria." The screening criteria listed in the report will be checked against the appropriate criteria in the *Project Team Notebook* and corrections will be made where necessary.

11. On page 14 of the *GDK Groundwater Samples* included in Appendix B, the Navy has provided analytical results for four sampling events from May 1997 through March 1998 at the background well GDKGWCL1. However, throughout this Section of the text, the Navy continues to present background values that do not correlate to the data on referenced page 14. For example, the text states that "Barium exceeded the background concentration of 95.9 µg/L in three of the 39 detections;..." However, the barium detections recorded for GDKGWCL1 are

61.9J, 54.7J, 46.1J, and 29.1J µg/L. It is unclear how the Navy concludes that the background concentration for screening is 95.9 µg/L . Another example is "Thirty-five of the iron detections exceeded the background concentration of 235 µg/L,..." Iron values on page 14 are recorded as 6250J, 4710, 2580J, 4800 µg/L. The Navy should clarify the origin of the background values used to screen the groundwater data and revise the text accordingly.

Response 11
The range of concentrations for barium detections is 29.1 µg/L to 61.9 µg/L and the arithmetic mean was calculated to be 48.0 µg/L. For screening purposes the "twice the mean" rule was utilized hence the 95.9 µg/L. Table 5.2 lists the Inorganic Element Background Calculations for Shallow Groundwater for Clouter Island.

Section 5.3.2 Groundwater Potability
The Navy's conclusion that groundwater quality at Clouter Island is such that the aquifer cannot be utilized as a drinking water source should be further substantiated in this document. Until data conclusively demonstrates that the aquifer beneath Clouter Island yields non-potable water, groundwater at Clouter Island must be considered potable to the end that MCLs must be applied. The Navy should proceed on this premise. The Navy must identify groundwater constituents of concern and evaluate the human health risk and ecological risks associated with those constituents. In the event that data (empirical data) does demonstrate that the aquifer beneath Clouter Island yields non-potable water, the Navy must still evaluate the constituents of concern with regard to ecological risk.

12. According to R.61-68 Water Classifications and Standards, one condition of an underground source of drinking water is that the total dissolved solids in the aquifer is less than ten thousand milligrams per liter (mg/l). The Navy is incorrect in stating that the Department proposed a total dissolved solids (TDS) value of 10,000 parts per million as a "preliminary screen to potentially preclude groundwater at a site from risk-based evaluation and subsequent remediation." The presence of TDS in excess of the 10,000 mg/l is but one factor. While elevated TDS may allow the Navy to conclude that the aquifer is not suitable as an underground source of drinking water, elevated TDS does not eliminate the need for risk-based evaluation. The ecological risk and the surface water quality standard for the Cooper River must be considered.

Response 12
The impact of Clouter Island groundwater on surface water is being evaluated as part of the Zone J water bodies investigation.

According to R.61-69 Classified Waters, that portion of the Cooper River that passes between the CNC and Clouter Island has the surface water designation Class SB. Groundwater discharge into the Cooper River from Clouter Island must not contravene the Class SB standard. See Section G of R.61-69 for a full explanation of Class SB.

13. The Navy has included salinity data on Table 5.11 entitled Total Dissolved Solids Estimations for Clouter Island Groundwater. Groundwater salinity values range from 0.56 percent (%) to

1.85 %. Please be aware that if groundwater underlying Clouter Island can be defined as "tidal saltwaters" pursuant to R.61-68.B.56 Water Classifications and Standards, then this groundwater does not constitute an "underground source of drinking water" as defined in R.61-68.B.58. The Navy must provide the groundwater monitoring well field data records to include the salinity data. Also see Comment 15.

Response 13
Groundwater sampling field data will be included in the RFI Report.

14. On referenced Table 5.11, the Navy has listed one concentration value for each of the four pertinent parameters: calcium, magnesium, potassium, and sodium (nutrients). Review of data listed for K694GW005 indicates that the value included on the Table 5.11 is the maximum value for that parameter in that well over the time period covered by the sampling events. Review of data listed for K694GW004 indicates that while maximum concentrations are listed for calcium and magnesium, the concentrations listed for potassium and sodium are both from the May 1997 sampling event. The Navy has been inconsistent. In order to present a valid argument, the Navy must evaluate the data for each of these parameters in each well by isolating the concentration values during each sampling event at each well so that the compositional ratio of the different parameters is maintained. It is inappropriate to mix data from sampling events in that there is a balanced compositional ratio among the referenced "nutrients", chlorine and TDS at any given time. See Reference below.

Response 14
The Navy will evaluate synoptic analytical data in assessing potability of shallow groundwater at Clouter Island.

15. In the absence of empirical total dissolved solids (TDS) data and empirical chlorine data, the Navy has presented "typical" values for calcium, magnesium, potassium, and sodium (nutrients) as determined by Drever (1982). The Navy did not include Drever as a reference in Section 9. The Navy must provide a full reference to Drever's publication and the pertinent portions of the 1982 publication to include the applicable mathematical formula(s) or ratios among the "nutrients". The Navy must provide the formula(s) used to calculate chlorine concentration based on the four parameters listed above and then apply that method to actual Clouter Island data.

> **It is strongly recommended that empirical data be acquired**, i.e. the Navy should install an appropriate number of wells on Clouter Island in order to determine TDS and chloride values. The Navy should send the monitoring well request to my attention.
>
> In the event that the TDS and/or chloride values do not support the Navy's conclusion that groundwater beneath Clouter Island is non-potable water, then additional monitoring of antimony, mercury, thallium, and cadmium will be required.

Response 15:
The cation concentrations used in calculating TDS for Clouter Island are actual values and were obtained from Clouter Island groundwater sample analytical

results. Drever presented "typical" values for cations and chlorine in seawater from which the relationship between Clouter Island groundwater and seawater salinity was evaluated. Clouter Island well purge percent salinity values obtained prior to groundwater sample collection were used as comparative data with TDS values that were calculated using Clouter Island analytical data. The verification of calculated TDS by the purge water percent salinity validates the premise proposed by the Navy. Therefore, no additional groundwater sampling will be proposed. A full reference to the 1982 publication and pertinent excerpts of the document by Drever shall be included in the report.

Section 6.1 Soil-to-Groundwater Cross-Media Transport

16. Throughout this Section the Navy states "The soil-to-groundwater pathway is not considered valid because of a lack of spatial persistence, a lack of exceedances in subsurface soil, and a lack of persistence in groundwater." This conclusion is in error with regard to the following parameters in that each of these parameters has been detected in groundwater samples from Clouter Island in concentrations above background; therefore, the pathway is complete and valid: chloromethane, dioxins (TEQs), napthalene, trichloroethene, aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium (total), cobalt, copper, cyanide, iron, lead, manganese, mercury, nickel, selenium, silver, thallium, tin, vanadium, and zinc. Although many of these parameters were not detected in concentrations greater than an established MCL, the soil-to-groundwater pathway is valid. These parameters should be considered constituents of potential concern and further evaluated.

Response 16

Aluminum, arsenic, beryllium, cadmium, chromium, iron, manganese, mercury, silver, and thallium were retained and further evaluated in section 7. Although aluminum and beryllium exceeded the MCL, they did not exceed respective RBC concentrations and were eliminated from further human health risk evaluation. Others which exceeded the respective MCL but were lacking in toxicity information were eliminated from the quantitative human health risk assessment. The ecological impact of Clouter Island groundwater on surface water is being evaluated as part of the Zone J water bodies investigation.

Section 6.4 Risk-Based Groundwater Transport and Surface Water Cross Media Transport

17. As stated above, groundwater discharge into the Cooper River from Clouter Island must not contravene the surface water Class SB standard. See Section G of R.61-69 for a full explanation of Class SB.

Response 17

The ecological impact of Clouter Island groundwater on surface water is being evaluated as part of the Zone J water bodies investigation.

Section 7.3.2 Groundwater COPCs

Section 7.11 Conclusion

18. The Navy retained arsenic, cadmium, chromium, iron, manganese, mercury, silver, and thallium as constituents of concern "if groundwater was a potable source." Note that mercury

must be included on Table 7.4 entitled Selection of Groundwater Exposure Point Concentrations. Until data conclusively demonstrates that the aquifer beneath Clouter Island yields non-potable groundwater, groundwater at Clouter Island must be considered potable to the end that MCLs must be applied. The Navy should proceed on this premise. The Navy must identify groundwater constituents of concern and evaluate human health risk and ecological risks. In the event that data does demonstrate that the aquifer beneath Clouter Island yields non-potable water, the Navy must still evaluate the constituents of concern with regard to ecological risk.

Response 18
Mercury will be added to Table 7.4. Ecological risk and the impact of Clouter Island groundwater on surface water are being evaluated as part of the Zone J water bodies investigation.

Section 8 Conclusions and Recommendations
19. The Navy has concluded that groundwater at Clouter Island is non-potable. Acquisition of empirical TDS data to support this conclusion is recommended. In the absence of conclusive data, the Navy must proceed on the premise that groundwater at Clouter Island constitutes a drinking water source.

Response 19
The Navy stands by the assertion that shallow groundwater at Clouter Island is non-potable. See response 15 above.

Appendix B
20. In Appendix B, the Navy has included Chain of Custody Records for the samples collected at Clouter Island. The Chain of Custody Records for groundwater samples do not include the stabilization data gathered during purging of the monitoring well. The Navy must provide the stabilization data for each well for each sampling event to include: temperature, specific conductivity, pH, and turbidity. The records should also include the total depth of the well at the time of sampling, the depth to groundwater, and the volume of water purged from each well prior to sampling.

Response 20:
Well purge, depth-to-water, and total depth data collected prior to sampling will be included in the report.

21. Chain of Custody Records for the groundwater samples collected in 2002 must be provided, along with the stabilization data referenced above.

Response 21:
Chain of Custody records and well purge data for samples collected in 2002 will be provided in the Report.

22. Clarification should be provided for the "EMPC" designation recorded by the laboratory for certain data. See page 30 of AOC 694 Groundwater samples for an example.

Response 22:
EMPC (Estimated Maximum Possible Concentration) is a qualifier used by laboratories for Dioxins. Clarification of this acronym shall be provided in the report.

23. Clarification should be provided for the "F5","U5" and/or "F3" designation added to the groundwater sample identification on the ID Form Report line of certain samples. See pages 55 and 59 of the AOC 694 Groundwater Samples for examples.

Response 23:
The letters F" and "U" refer to Filtered and Unfiltered groundwater samples. The number refers to the event during which the sample was collected. Section 3; Field Investigation; of the report will be revised to clarify this nomenclature.

SCDHEC RISK COMMENTS
Susan Bird

1.) Section 1.1.2, Site Investigation History, Pages 1.7 and 1.8: The text is confusing regarding the additional number of soil samples collected as part of this investigation. Page 1.7 states that soil samples were collected from 10 locations in April 2002 and from 4 locations in May 2002. However, Figure 3-1, Soil Sample Locations, shows only 13 sample locations. Please clarify.

Response 1:
The label for sample location 694SB41A is immediately adjacent to 694SB041 and was inadvertently left off the figure. Figure 3-1 will be revised to include location 694SB41A.

2.) Section 5.2.2.1, Surface Soil Inorganic RBC Exceedances, Page 5.13: The text states that the 17 sample exceedances are within the "range of the base-wide thallium results". The text should read that the 17 exccedances are within the "range of base-wide thallium background results".

Response 2:
The text shall be revised to state within the "range of base-wide thallium background results".

3.) Section 7.3, Identification of COPCs, Page 7.4, Paragraph 4: The text states that he "maximum concentrations exceeding either an RBC or MCL were identified as COPCs". The text should be revised to include background concentrations.

Response 3:
The text shall be revised to include background concentrations.

4.) Section 7.7.4, Soil, Page 7.16: As discussed in previous meetings and telephone conversations, please eliminate iron as a COPC since on-site concentrations do not exceed the

base-wide background range and conservative recommended daily intake values. Since no apparent source of iron contamination has been identified at Clouter Island, there is no need to carry iron through risk assessment calculations. Please revise the text and modify all applicable tables.

Response 4:
Text and tables shall be revised to eliminate iron as a COPC.

5.) According to EPA guidance and the IEUBK model, averaging the concentration of lead across a site is appropriate for determining the exposure concentration. However, it appears that the RFI Addendum includes average concentrations of lead across the entire island. It is unrealistic and not conservative to assume that the child receptor would be mobile over the entire island; therefore it is recommended that a more realistic "1/2 acre box" exposure scenario be created. The average concentration within the ½ box (incorporating the greatest number of samples collected as well as the highest concentrations of lead) still falls below the child residential screening value of 400, therefore the overall site conclusions can remain the same.

Response 5:
Soil boring 694SB41A was located as close as practicable to boring 694SB041 to verify the lead concentration detected in sample 694SB04101. Analysis of verification sample 694SB41A01 confirms that the detected lead concentration in 694SB04101 was anomalous and due to an isolated occurrence of a lead fragment or mineralogical source. The source material responsible for the elevated lead concentration in sample 694SB04101 was subsequently removed in the sample submitted to the laboratory for chemical analysis and is no longer on site. Therefore, the lead concentration of 17.3 mg/kg detected in the verification sample will be used in the RFI in accordance with verbal discussions between the Navy (EnSafe) and SCDHEC (Susan Byrd and Jerry Stamps) of January 2003. Lead concentrations detected in surrounding upper and lower interval soil samples are in support of verification sample analytical data and do not indicate a problem with lead concentrations in soil. Evaluation of the site using the 0.5 acre box scenario is consequently not needed.

6.) As discussed with Ensafe during recent telephone conversations and in accordance with the CNC Project Team Notebook, all samples collected on or adjacent to present or historical railroad lines should be screened against the CNC railroad line background values for BEQ, arsenic and copper (CH2MHILL Tech Memo, August 2001). Using the railroad line BEQ background value of 3,417 ug/kg for screening, BEQ would be eliminated as a soil COPC. Please rescreen all BEQ concentrations in accordance with the team notebook and modify all applicable text and tables.

Response 6:
BEQ concentrations detected in soil samples adjacent to railroad facilities on Clouter Island will be re-screened in accordance with the Project Team Notebook. All applicable text, tables, and figures will be revised to reflect results of the re-

screening.

7.) After review of the Team Notebook COPC/COC refinement sections as well as the above mentioned comments, it appears that significant changes are needed in Table 7.1. Please modify the risk assessment to include only those compounds that are site related and that do not fall within appropriate "background" ranges.

Response 7:
Table 7.1 and risk assessment will be revised to include only those compounds that are site related, and that do not fall within appropriate "background" ranges.